amc technical brief

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The amazing Horwitz function

Collaborative trials

For many years Dr William Horwitz has been well known as an advocate of the collaborative tri using the more correct IUPAC terminolog interlaboratory method performance stu collaborative trials, the organiser dist duplicated set of test materials t laboratories, which analyse t defined method. The resul organiser, who calcula of the repeatability and laboratory) stand cs are taken as measure 66an161.00110tall 88.61389 225.7668 0 0 0.02 n method. Tho as (mostly in food analys ected to a collaborative trial and En Horwitz made a close study of the results.

Moreover, the empirical exponent for the region between 10 ppb and 10% m/m is not exactly as given in the Horwitz function but closer to 0.824. But despite these small deviations, the Horwitz function is still impressive, as can be seen in Figure 2.

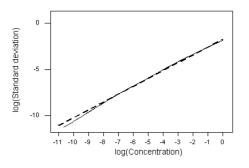


Fig 2. Trend of data from collaborative trials (shown as a lowess fit, solid line) compared with the Horwitz function (dashed line). The systematic deviation below about 10 ppb is apparent. Units are mass fractions (e.g., 1% = 0.01, 1 ppm = 10^{-6} .)

Compilations of data from proficiency tests show similar functions. For example, early data from FAPAS (a foodstuffs proficiency test scheme) gave an excellent fit to a Horwitz-style function³, of the

form $\sigma = 0.023c^{0.826}$. This indicates a slightly lower precision than collaborative trials, but that is hardly surprising: proficiency test data include uncertainty due to variation in analytical method, obviously not present in collaborative trials.

A benchmark

The Horwitz function is now widely used as a benchmark for the performance of analytical methods, via a measure called the 'Horrat' which is defined as Horrat = s_R/σ_H .

An analytical method that during collaborative trial gives Horrats that are substantially worse than unity is regarded as flawed and requi